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UTILITY PATENT APPLICATION **TRANSMITTAL**

00766 Attornev Docket No. Wen-Shi Huang First Inventor MAGNETIZING STRUCTURE... Title

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Express Mail Label No. EK832515066US Assistant Commissioner for Patents APPLICATION ELEMENTS ADDRESS TO: **Box Patent Application** Washington, DC 20231 See MPEP chapter 600 concerning utility patent application contents. Fee Transmittal Form (e.g., PTO/SB/17) CD-ROM or CD-R in duplicate, large table or (Submit an original and a duplicate f Computer Program (Appendix) Applicant claims small entity status. 8. Nucleotide and/or Amino Acid Sequence Submission See 37 CFR 1.27. (if applicable, all necessary) (preferred arrangement set forth below)
- Description Computer Readable Form (CRF) 3. X - Descriptive title of the invention b. Specification Sequence Listing on: - Cross Reference to Related Applications i. ☐ CD-ROM or CD-R (2 copies); or - Statement Regarding Fed sponsored R & D - Reference to sequence listing, a table, ii.□ paper or a computer program listing appendix Statements verifying identity of above copies - Background of the Invention - Brief Summary of the Invention ACCOMPANYING APPLICATION PARTS - Brief Description of the Drawings (if filed) Assignment Papers (cover sheet & document(s)) - Detailed Description 9. X - Claim(s) 37 CFR 3.73(b) Statement Power of 10. - Abstract of the Disclosure Attorney (when there is an assignee) English Translation Document (if applicable) 4. X Drawing(s) (35 U.S.C. 113) [Total Sheets 5] Copies of IDS Information Disclosure [Total Pages 4] 12. 5. Oath or Declaration Citations Statement (IDS)/PTO-1449 **Preliminary Amendment** Newly executed (original or copy) Copy from a prior application (37 CFR 1.63 (d)) (for continuation/divisional with Box 17 completed) 13. Return Receipt Postcard (MPEP 503) (Should be specifically itemized) Certified Copy of Priority Document(s) (if foreign priority is claimed) **DELETION OF INVENTOR(S)** 15. X Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b). Application Data Sheet. See 37 CFR 1.76 17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76: of prior application No..___ Divisional Continuation Continuation-in-part (CIP) Group / Art Unit. For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts. 18. CORRESPONDENCE ADDRESS or X Correspondence address below Customer Number or Bar Code Label (Insert Customer No. or Altach bar code label here) Christine R. Ethridge, Esquire Name Kirkpatrick & Lockhart 535 Smithfield Street Henry W. Oliver Building, Address 15222-231 PΑ Pittsburgh Zip Code State City 412) 355-65**D**1 (412) 355-8619 USA Telephone Country 30,557 Christine R. Ethridge Registration No. (Attorney/Agent) Name (Print/Type)

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First Named Inventor	Wen-Shi	Huang
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METHOD OF PAYMENT (check one) FEE CALCULATION (continued)		
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See 37 CFR 1.27	112 920* 112 920* Requesting publication of SIR prior to Examiner action	
2. X Payment Enclosed: X Check Credit card Order Other	113 1,840* 113 1,840* Requesting publication of SIR after Examiner action	
FEE CALCULATION	115 110 215 55 Extension for reply within first month	
	116 380 216 190 Extension for reply within second month	
1. BASIC FILING FEE Large Entity Small Entity	117 870 217 435 Extension for reply within third month	
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	128 1,850 228 925 Extension for reply within fifth month	
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2. EXTRA CLAIM FEES	142 1,210 242 605 Utility issue fee (or reissue)	
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103 18 203 9 Claims in excess of 20	146 690 246 345 Filing a submission after final rejection (37 CFR § 1.129(a))	
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109 78 209 39 ** Reissue independent claims over original patent	179 690 279 345 Request for Continued Examination (RCE)	
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MAGNETIZING STRUCTURE OF MOTOR

FIELD OF THE INVENTION

The present invention relates to a magnetizing structure of a motor, and more particularly to a structure for magnetizing a rotor magnet or a stator magnet of a direct current motor.

BACKGROUND OF THE INVENTION

A traditional direct current motor essentially comprises two major components: a rotor and a stator, one of which is made of permanent magnet and the other is an electric magnet, and the one is disposed circumferentially by the other. Between a rotor and a stator, there exists an air gap. In one case, an inner rotor rotates within a stator; in another case, an outer rotor rotates around an inner stator. A permanent magnet incorporated on either a rotor or a stator directs a magnetic field into the air gap, which interacts with another magnetic field of changing polarity to develop the torque for driving a motor.

Fig. 1 shows a magnetizing structure that is commonly found in a motor. Such structure of an outer-rotor type motor includes a rotor 12 having a magnet cylinder 121 with smooth surfaces on both sides and a stator 11 having a plurality of silicon steel sheets 111 wound by a plurality of winding coils 13. When a current is applied to a winding coil, an electric magnetic field is created to repulse the magnetic field caused from the permanent magnet, thereby the rotor rotates and drives an article such as a fan.

The permanent magnet is usually in a shape of cylinder; therefore, the term "magnet cylinder" hereinafter means a cylindrical-shaped magnet, unless otherwise specified.

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Since the inductive magnetic field in the silicon steel sheets 111 on the stator 11 must reach to an adequate level for starting a rotor, the traditional method includes steps of increasing quantities of winding coils and broadening the size of the silicon steel sheets. Since the current flowing in a motor is considerably higher than the rated load current during the period of starting a rotor, a motor can be easily damaged through overheating. Thus, increasing quantities of winding coils is neither practical nor effective. In addition, the silicon steel sheet 111 on the stator 11 is customarily designed to be asymmetric for changing the air gap between the stator 11 and rotor 12 during the period of starting, as can be seen in Fig. 1. Because such type of silicon steel sheet is costly, broadening its size is generally not suitable. A locked rotor condition is common in the customarily used motor, which also requires special attention.

Therefore, the present invention provides an improved magnetizing structure for overcoming the problems described above.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a structure for magnetizing a rotor magnet of a motor, which includes a rotor having a magnet cylinder with a wavy curve surface and a stator having a plurality of silicon steel sheets wound by a plurality of winding coils.

Preferably, the wavy curve surface of the magnet cylinder is one of an inner wavy curve surface and an outer wavy curve surface.

Preferably, the wavy curve surface of the magnet cylinder includes a plurality of curve surfaces having different arc centers.

The plurality of silicon steel sheets can be symmetric or asymmetric; preferably, they are symmetrical.

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Moreover, the present invention can be applied to not only the outerrotor type motor but also an inner-rotor type motor.

According to another aspect of the present invention, there is provided a structure for magnetizing a stator magnet of a motor, which includes a stator having a magnet cylinder with a wavy curve surface and a rotor having a plurality of silicon steel sheets wound by a plurality of winding coils.

Certainly, the wavy curve surface of the magnet cylinder can be one of an inner wavy curve surface and an outer wavy curve surface. The wavy curve surface of the magnet cylinder includes a plurality of curve surfaces having different arc centers. The plurality of silicon steel sheets is preferably symmetrical.

According to a further aspect of the present invention, there is provided a structure for magnetizing a rotor magnet of a motor, which includes a rotor having a magnet cylinder with a lumpy edge and a stator having a plurality of silicon steel sheets wound by a plurality of winding coils. The lumpy edge is a combination of a plurality of concave surfaces and a plurality of convex surfaces.

According to a still further aspect of the present invention, there is provided a structure for magnetizing a stator magnet of a motor, which includes a stator having a magnet cylinder with a lumpy edge and a rotor having a plurality of silicon steel sheets wound by a plurality of winding coils. The lumpy edge is a combination of a plurality of concave surfaces and a plurality of convex surfaces..

The above objects and advantages of the present invention will become more readily apparent to those ordinarily skilled in the art after reviewing the following detailed description and accompanying

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drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a sectional view showing a magnetizing structure of motor according to prior art;

Fig. 2 is a sectional view showing a structure for magnetizing of a rotor having a magnet cylinder with an inner wavy curve according to the first preferred embodiment of the present invention;

Fig. 3 is a sectional view showing a structure for magnetizing a rotor having a magnet cylinder with an outer wavy curve according to the first preferred embodiment of the present invention;

Fig. 4 is a sectional view showing a structure for magnetizing a stator having a magnet cylinder with an outer wavy curve according to the second preferred embodiment of the present invention; and

Fig. 5 is a perspective view showing a structure for magnetizing a rotor having a magnet cylinder with a lumpy edge according to the third preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig. 2, the first preferred embodiment of the present invention provides a structure for magnetizing a rotor magnet, which includes a rotor having a magnet cylinder 22 with an inner wavy curve surface 25 and a stator 21 having a plurality of silicon steel sheets 24 wound by a plurality of winding coils 23. The silicon steel sheets 24 are symmetrical, which facilitates mass production to reduce cost. Since the magnet cylinder 22 is manufactured by a molding and sintering process, the shape or size of it can be predetermined and the cost is not high. Owing to the inner wavy curve surface 25, the magnet cylinder 22 directs a magnetic field into the air gap for interacting with the

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inductive magnetic field easily to develop the torque and radiate the internally generated heat.

The structure for magnetizing a rotor magnet shown in Fig. 3 is the same as that in Fig. 2, except that a rotor having a magnet cylinder 22 with an outer wavy curve surface 39.

Referring to Fig. 4, the second preferred embodiment of the present invention provides a structure for magnetizing a stator magnet, which includes a stator having a magnet cylinder 40 with an outer wavy curve surface 45 and a stator 41 having a plurality of silicon steel sheets 42 wound by a plurality of winding coils 43. Certainly, the outer wavy curve surface can be replaced with an inner wavy curve surface.

Referring to Fig. 5, the third preferred embodiment of the present invention provides a structure for magnetizing a rotor magnet. The structure in Fig. 5 is the same as that in Fig. 2, except that the rotor has a magnet cylinder with a lumpy edge which is a combination of a plurality of concave surface 52 and a plurality of convex surfaces 51. Certainly, a structure for magnetizing a stator magnet is also suitable, wherein the stator has a magnet cylinder with a lumpy edge which is a combination of a plurality of concave surfaces and a plurality of convex surfaces.

As will be apparent from the above description according to the present invention, the improved magnetized structure for magnetizing a rotor magnet or a stator magnet of a direct current motor is suitable to start a motor easily, radiate the internally generated heat quickly and prevent the locked rotor condition.

While the invention has been described in terms of what are presently considered to be the most practical and preferred embodiments, it is to be understood that the invention needs not be limited to the

disclosed embodiment. On the contrary, it is intended to cover various modifications and similar arrangements included within the spirit and scope of the appended claims which are to be accorded with the broadest interpretation so as to encompass all such modifications and similar structure.

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WHAT IS CLAIMED IS:

- 1. A structure for magnetizing a rotor magnet of a motor, comprising:
 a rotor having a magnet cylinder with a wavy curve surface; and
 a stator having a plurality of silicon steel sheets wound by a plurality
 of winding coils.
- 2. A structure of Claim 1, wherein said wavy curve surface of the magnet cylinder is one of an inner wavy curve surface and an outer wavy curve surface.
- 3. A structure of Claim 2, wherein said wavy curve surface of said magnet cylinder includes a plurality of curve surfaces having different arc centers.
 - 4. A structure of Claim 1, wherein said plurality of silicon steel sheets is symmetrical.
- 5. A structure for magnetizing a stator magnet of a motor, comprising:
 a stator having a magnet cylinder with a wavy curve surface; and
 a rotor having a plurality of silicon steel sheets wound by a plurality of winding coils.
 - 6. A structure of Claim 5, wherein said wavy curve surface of said magnet cylinder is one of an inner wavy curve surface and an outer wavy curve surface.
 - 7. A structure of Claim 6, wherein said wavy curve surface of said magnet cylinder includes a plurality of curve surfaces having different arc centers.
- 8. A structure of Claim 5, wherein said plurality of silicon steel sheets is symmetrical.
 - 9. A structure for magnetizing a rotor magnet, comprising: a rotor having a magnet cylinder with a lumpy edge; and

- a stator having a plurality of silicon steel sheets wound by a plurality of winding coils.
- 10. A structure of Claim 9, wherein the structure of said lumpy edge is a combination of a plurality of concave surfaces and a plurality of convex surfaces.
- 11. A structure for magnetizing a stator magnet, which includes a stator having a magnet cylinder with a lumpy edge and a rotor having a plurality of silicon steel sheets wound by a plurality of winding coils.
- 12. A structure of Claim 11, wherein the structure of said lumpy edge is
 a combination of a plurality of concave surfaces and a plurality of convex surfaces.

MAGNETIZING STRUCTURE OF MOTOR

ABSTRACT OF THE DISCLOSURE

The present invention provides a structure for magnetizing a rotor magnet of a motor, which includes a rotor having a magnet cylinder with a wavy curve surface and a stator having a plurality of silicon steel sheets wound by a plurality of winding coils. The present invention also provides a structure for magnetizing a stator magnet of a motor, which includes a stator having a magnet cylinder with a wavy curve surface and a rotor having a plurality of silicon steel sheets wound by a plurality of winding coils.

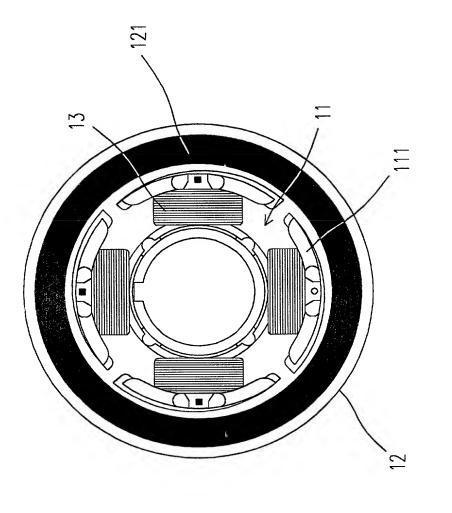


Fig. 1(PRIOR ART)

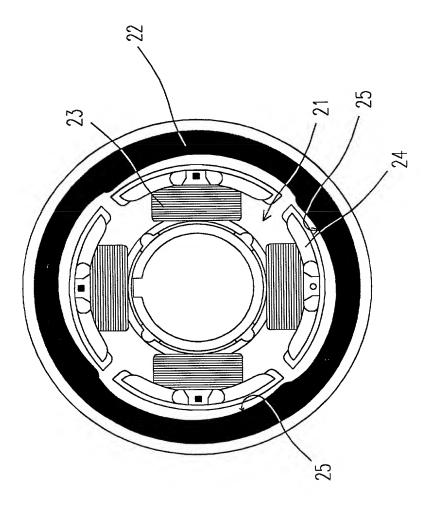


Fig. 2

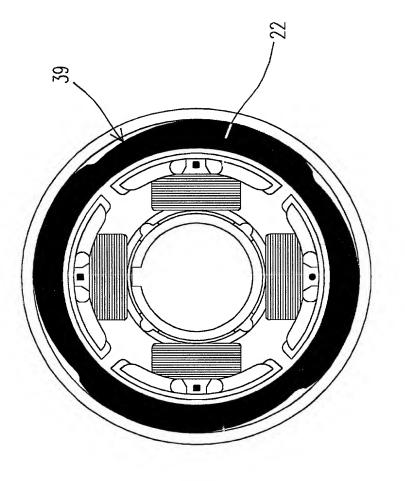


Fig. 3

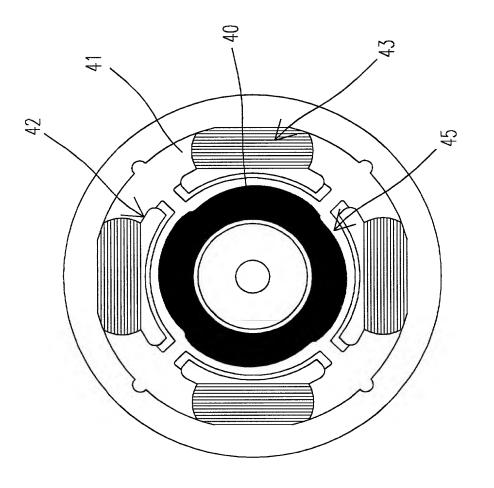


Fig. 4

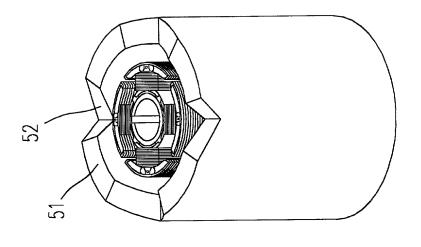


Fig. 5

Declaration and Power of Attorney For Patent Application English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I verily believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below)of the subject matter which is claimed and for which a patent is sought on the invention entitled

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I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of title 35, United States Code, § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability of the application as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

See Attachment

Send Correspondence to Kirkpatrick & Lockhart LLPc/o C. R. Ethridge, Esq.

Henry W. Oliver Building, 535 Smithfield Street, Pittsburgh, PA 15222,

Direct Telephone Calls to: Kirkpatrick & Lockhart LIPc/o C. R. Ethridge, Esq. U.S.A. at telephone No. (412) 3556500 C. R. Ethridge Phone No. (412) 355-8619

Full name of sole or first inventor	
Wen-Shi Huang	Data
Inventor's signature	Date Sep. 13. Novi
Residence No.31-1,Shien Pan Rd., Kuei San Industrial Zone, Taoyuan Hsien,Taiwan , F	ROC
Citizenship	
A citizen of Taiwan, R.O.C.	
Post Office Address	
The same as above	
Full name of second joint inventor, if any	
Lin Kuo-Cheng	
Second Inventor's signature Lin Luo-Cheng	Date Sep. 13,2000
Residence	
No.31-1, Shien Pan Rd., Kuei San Industrial Zone, Taoyuan Hsien, Taiwan, I	R.O.C.
Citizenship	
A citizen of Taiwan, R.O.C.	
Post Office Address	
The same as above	
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(Supply similar Information and signature for third and subseq	uent joint inventors.)
(Supply Silling Illioringtion and Oightatalo is: Line and outside	

Full name of third joint inventor, if any Tsai Ming-Shi	
Inventor's signature Teal Ming-	-5hi Date Sep. 13, 2000
Residence No.31-1,Shien Pan Rd., Kuei San Industrial Zone, Taoyuan Hsi	
Citizenship A citizen of Taiwan, R.O.C.	
Post Office Address The same as above	
Full name of fourth joint inventor, if any	
Second Inventor's signature	Date
Residence	
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Post Office Address	
Full name of fifth joint inventor, if any	
	Date
Second Inventor's signature	Date
Residence	
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Full name of sixth joint inventor, if any	
Second Inventor's signature	Date
Residence	
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Post Office Address	
Supply similar Information and signature for third a	nd subsequent joint inventors.)

ATTACHMENT

ATTORNEYS OF Kirkpatrick & Lockhart LLP

Michael G. Biro Arthur Z. Bookstein Carol I. Bordas Roberto Capriotti Tara C. Clancy Maria Comninou George D. Dickos Thomas J. Edglington Christine R. Ethridge Jesse A. Hirshman James Joyce Mark Knedeisen William E. Kuss James R. Kyper Michael D. Lazzara Mark R. Leslie Franklin B. Molin Robert A. Muha Donald R. Palladino	Reg. No. P-46,556 Reg. No. 22,958 Reg. No. 37,284 Reg. No. P-46,599 Reg. No. 40,935 Reg. No. 44,626 Reg. No. 30,048 Reg. No. 34,324 Reg. No. 30,557 Reg. No. 40,016 Reg. No. 43,700 Reg. No. 42,747 Reg. No. 41,919 Reg. No. 27,346 Reg. No. 27,346 Reg. No. 36,360 Reg. No. 37,397 Reg. No. 37,397 Reg. No. 44,249 Reg. No. F-46,976
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